

# SHIHAO ZHANG

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## Education

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### Computer Science | National University of Singapore

Aug. 2021- May. 2025 (expected). *Ph.D.*

### Software Engineering | South China University of Technology

Sep. 2017-Jul. 2020. *Master of Science*

### Mathematics and Applied Mathematics | South China University of Technology

Sep. 2012-Jul. 2016. *Bachelor of Science*

## Research and Work Experience

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My PhD research focuses on **regression representation learning**, using information theory and topology as tools with a theoretical emphasis. In contrast, my master's research was more application-oriented, concentrating on **medical image segmentation**.

### National University of Singapore (PhD student, advisor: [Angela Yao](#)) 2021.08-Present

Regression Representation Learning [1, 2, 3]: Exploring the differences between classification (with categorical targets) and regression representations (with continuous targets), providing a deeper understanding of both. The insights gained benefit a wide range of regression tasks, e.g., depth estimation, super-resolution, pose estimation, and age estimation.

### Singapore National Eye Center (Research Associate, advisor: [Daniel SW Ting](#)) 2020.09-2021.08

- Diabetic Retinopathy (DR) Incidence and Progression [7]: Developed predictive models to assess the likelihood of DR development and identified key features influencing DR incidence.

- Small Incision Lenticule Extraction: Automated and optimized machine parameters to replace manually set values, improving surgical precision and outcomes.

### CVTE Research (Full-time Intern, advisor: [Yanwu Xu](#) & [Huazhu Fu](#) & [Qingyao Wu](#)) 2018.06-2019.08

AS-OCT Data Processing and Retinal Image Segmentation [5, 6]: Developed a grading index to assess cataract severity based on the density of segmented tissue layers.

### South China University of Technology (Master student, advisor: [Mingkui Tan](#)) 2017.09-2020.07

Mainly focus on medical image segmentation [4, 5, 6], with additional research in Click-Through Rate prediction and super-resolution during the early stages of my master's studies.

## Selected Publications

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[1] S. Zhang, Y. Yan, and A. Yao. Improving Deep Regression with Tightness. Under Review. 2024

- [2] **S. Zhang**, K. Kawaguchi, and A. Yao. Deep Regression Representation with Topology. **ICML 2024** (<https://github.com/needyllove/PH-Reg> )
- [3] **S. Zhang**, L. Yang, M. Bi Mi, X. Zheng, and A. Yao. Improving Deep Regression with Ordinal Entropy. **ICLR. 2023** (<https://github.com/needyllove/OrdinalEntropy>)
- [4] **S. Zhang**, H. Fu, Y. Xu, Y. Liu, and M. Tan. Retinal Image Segmentation with Structure-Texture Demixing Network. **MICCAI. 2020**
- [5] **S. Zhang**, H. Fu, Y. Yan, Y. Zhang, Q. Wu, M. Yang, M. Tan, and Y. Xu. Attention Guided Network for Retinal Image Segmentation. **MICCAI. 2019** (<https://github.com/HzFu/AGNet>)
- [6] **S. Zhang**, Y. Yan, et al. Guided M-Net for High-resolution Biomedical Image Segmentation with Weak Boundaries and Noise. **OMIA. 2019 (best paper)**
- [7] WY Ng, **S. Zhang**, et al. Updates in Deep Learning Research in Ophthalmology. **Clinical Science. 2021**

## Awards & Honors

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- National scholarship. Rank: 1/55, award to top 1% of students, 2019.
- 2019 Best Paper Award. 6<sup>th</sup> MICCAI Workshop on Ophthalmic Medical Image Analysis.
- PALM 2019. Rank second in the classification (<https://palm.grand-challenge.org/Home/> ).
- AGE 2019. Rank first in the localization and rank second in the classification (<https://age.grand-challenge.org/Home/> ).